Argiolestes spungisi sp. nov. (Odonata: Argiolestidae) from New Guinea

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Abstract: A new species of *Argiolestes* is described: *Argiolestes spungisi* sp. nov. (type locality: Indonesia, West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE, Aqafu springs, deposited LINC). Ecological notes on habitat (forest brooks) of type locality are given.

Key words: Odonata, damselfly, Zygoptera, Megapodagrionidae, Argiolestidae, *Argiolestes,* taxonomy, New Guinea.

Introduction

Quite recently the former subfamily Argiolestinae of family Megapodagrionidae was raised to family level (Kalkman & Theischinger 2013). The genus *Argiolestes* Selys, 1862 currently includes 12 species, found on New Guinea and adjacent islands, the North Moluccas and on Sulawesi. Most species seem to have small ranges and none is known from more than five records (Kalkman & Theischinger 2013; Kalniņš 2014). The type species of *Argiolestes* is *A. australis* (Guérin-Meneville, 1830).

In this article a new species of *Argiolestes* is described, also concise ecological notes are given.

Materials and methods

Specimens described below were collected using an insect net during hiking in a narrow (ca 10 m broad at the bottom) shady and wet ravine in primary lowland rainforest at Aqafu springs (West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE). The ravine was about 25 m deep at the place where small spring came out from vertical limestone rock forming the wall of the ravine. The stream was almost dry with water dropping from the cliff to the cavities (pools) in the rock. These cavities were about 10 cm diameter and ca 5 cm deep, with no vegetation and no damselfly larvae in them. The water continued overflowing from cavities to the bed of ravine mixing with very moist soil and not forming a course of stream. 10-20 m lower from the spring water accumulated again in small cavities on large pieces of limestone rocks partially forming the bed of the ravine. All visually observed or disturbed specimens were collected. Inspections were made during daytime (from 14:00 to 15:30 o'clock) in sunny weather, with temperature in forest shadow +25-30^{0}C. Humidity was not specially measured, but in the ravine it was pronounced wetter than outside of ravine.

For detailed comparison of characters, a specimen of *A. australis* was studied as well. The studied specimen of *A. australis* was collected in INDONESIA E, 16.02.2012. Raja Ampat, Waigeo Island, Waisai 10-13 km NE, 00˚21’17’’S, 130˚54’37’’E, ~70 m; primary lowland rainforest on limestone, creek, leg. Dmitry Telnov. The small creek came out from almost vertical limestone rock and was forming a relatively wide, open streambed. The stream stretch was ca 20-30 meters long (between the rock and forest edge / mangroves). The damselflies were flying over and along the stream on the sunny place.

All specimens were preserved in 70 % ethanol. They were studied using a Leica S6D stereomicroscope. Specimen photographs in the laboratory – using a Canon EOS 450D SLR camera attached to the microscope, and CombineZP software was used for image stacking. Holotype and paratypes of the new species are currently deposited in the Latvian Invertebrate collection (LINC) in Sigulda, Latvia. All label data are reproduced exactly, with no corrections or additions. All labels are printed on orange paper.

Abbreviations used in the text:

LINC – Latvian Invertebrate collection (author’s collection), Sigulda, Latvia;
Fw – forewings;
Hw – hindwings;
S – abdominal segment(s).

Taxonomic part

Unique characteristics within Argiolestidae

The males of the genus *Argiolestes*, previously considered as *Argiolestes* s. str. (Kalkman et al. 2010), have several well marked characters different from other species of Argiolestidae (Kalkman & Theischinger 2013; Kalniņš 2014):

1. the two apical lobes of the genital ligula are at least four times as long as broad;
2. part of S10 and cerci are pale (whitish or blue in life) contrasting with darker S9 (clearly visible in the field). This is only visible in fully mature specimens and is more easily seen in alive individuals;
3. base of cercus possesses a basal flange in all species except *A. celebensis* Kalkman, 2007 and *A. tuberculiferus* Michalski et Oppel, 2010 (Kalkman 2007; Michalski & Oppel 2010).

Description of new species

Argiolestes spungisi **sp. nov.** (Figs 1-8, 11, plates 52-54)
http://zoobank.org/82FC7F2D-8B68-4548-8C90-1EC6EB3B6788
Holotype ♂ LINC: INDONESIA E, 04.09.2015. West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE, Aqafu springs, 01°23’15’’S, 132°22’04’’E, ~330-340 m; primary lowland rainforest on limestone, spring Leg. Dmitry Telnov.
Paratypes 3♂ LINC: same label as in holotype.

Derivatio nominis: Patronymic. This species is named after my teacher in invertebrate zoology and charismatic person assoc. prof. Dr. biol. Voldemārs Spuņģis (Latvian University, Rīga), who supported me in science since 1992.

The description below is based on the male holotype (Plate 52 figs 1 & 5), except measurements, where paratypes (Plate 52 figs 2-4) were used as well. The specimen is relatively well preserved, however the tip of the abdomen (S7-S10 and appendages) are broken off, but all parts are in one tube. Tip of abdomen (S7-S10 and appendages) is broken by paratypic specimen No 1; two legs are missing in this specimen. Tip of abdomen (S8-S10 and appendages) are broken in paratypic specimen No 2; one leg is missing in this specimen. Tip of abdomen (S8-S10 and appendages) and three legs are broken in paratypic specimen No 3; two legs are missing in this specimen. The genital ligula was broken and missing during the photography process. In tube of Paratype No 3. four separate legs were put but I was unable to identify from which paratype they originate. Information on colour pattern is based partly from preserved specimens, who lost the light blue colour on thorax, abdomen and on the face. The paratype specimens correspond very closely to the holotype and confirm the information given on colouration.

Measurements (mm): Total body length 41-42, abdomen (S1-S10, without appendages) 32, Fw 26-27; Pt in Fw 1.9 (costal length), 2.4 (greatest length); Pt in Hw 2.0 (costal length), 2.5 (greatest length).

Head: Labium pale brown with the anterior third shiny dark brown to black. Front of face, including labrum, mandibles, side margins of postclypeus brown (preserved specimen!); anteclypeus dark, and lower posterior corner of genae dull black. The brown colour extends along the margin of the eye; remainder of head including antennae dull black (Plate 53 fig. 1).

Thorax: Prothorax dark brown laterally, but pale with dark brown rings dorsally (Figs 1-4). Shape of anterior and posterior lobe as shown in Figs 5-8, slightly variable between individuals. Ground colour of synthorax is black with a clear pattern as shown in Plate 53 figs 2-3; pattern grayish-brown in the studied specimen. Coxae and trochanters pale brown, femora pale brown, but black at the knees and with a black stripe laterally. Inner side of femora not flattened. Tibiae getting darker from femora to tarsi; tarsi dark brown to black; spines black. The femora of the first, the second and the third pair of legs with respectively 6-8, 7-8, and 10-11 spines on outer side. Tibiae of first pair of legs with 12-13 spines on outer side. Tibiae of second and third pair of legs with 10-13 and 10-12 spines on outer side respectively.

Wings: Fw and Hw hyaline. Venation black. Fw and Hw of equal length and all with 2 Ax. Fw with 22-25 Px; Hw with 22-23 Px. Arculus slightly distal to level of Ax2; discoidal cell in Fw very long, costal side ca 1.5 times as long as distal side, most acute angle ca 40°. Ac closer to Ax1 than to Ax2. Three cells between discoidal cell and subnodus. Pt - dark brown. 1-3 cells beyond Pt divided. Up to three rows of cells between anal vein and hind margin of Hw. Fields between IR2 and R3, between R3 and IR3, and between IR3 and R4 containing each three or more rows of cells distally (Plate 52 figs 1-4).

Abdomen: S1 and S2 dark brown with ventral half and spots on sides and dorsal part pale brown, S3-S8 dark brown with white marks on sides and ventral part on the anterior fifth. S9 (and some specimens also S8) is dark brown. As can be seen on Plate 54 figs 1-4, almost all of S10 was white (except thin black line in anterior part) when the specimen was alive and this would probably be visible in better-preserved specimens. Hind margin of S10 without spines and slightly depressed in the middle. Epiproct is upturned and prominent in dorsal view. Shape of superior appendages shown on the Plate 54 figs 1-8 with basal flange slightly variable between individuals. Both superior and inferior appendages are white; inferiors ca 1/3 the length of superiors. As can be seen in Plate 54 figs 5-8, the inferior appendages have conical tips and show slight variability between individuals. Basal flange of superior appendages almost 1/2 their length. Lower apical flange of superior appendages are moderately expanded and simple. Upper flange are far less prominent and visible mainly due to a row of black blunt denticles. The apical part of the lower apical flange is divided from the apex of the appendages by a moderate incision. Outer border of superior appendages bears two to three moderately large and one or two small spines. Genital ligula as shown in Fig. 11, with two very long and slender lateral horns.

The following photos showing characters of the *A. australis* (Guérin-Meneville, 1830) are given for comparison: head (Plate 53 fig. 4), thorax (Plate 53 fig. 5), prothorax (Figs 9-10), male accessory genitalia (Fig. 12) and tip of abdomen (Plate 54 figs 9-10) as well.

Differential diagnosis: Males of *Argiolestes spungisi* sp. nov. have short inferior appendages which are less than half (ca 1/3) the length of superior appendages. This character is only shared with *A. australis*, *A. celebensis*, *A. tuberculiferus* and *A. pallidistylus* Selys, 1878. *Argiolestes spungisi* sp. nov. can be distinguished from other congeners by the inferior appendages (*A. spungisi* sp. nov. has conical tips while *A. australis* has rounded tips); superior appendages with an inner basal flange which runs along the axis of the appendages for a third or half of the length (inner basal flange absent in superior appendages of *A. celebensis* and *A. tuberculiferus*); and lack of large pale spots with well-defined marks on front and sides of thorax (in *A. pallidistylus* large blue marks present on front of thorax and markings on side of thorax are blurred).

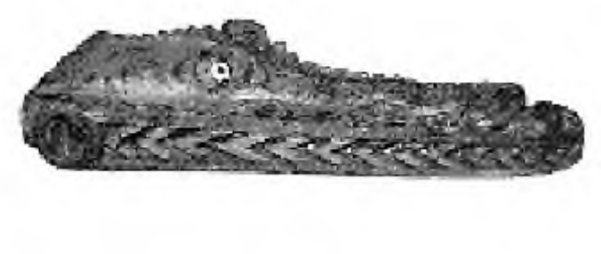
Ecological notes: Individuals of *A. spungisi* sp. nov. were observed slowly flying one by one (not in groups) around the spring and the cavities (approximately 4-5 m^2), 0.3 m above the water surface. They were barely visible at dusk of the ravine, as their bodies are brownish like the old limestone rock and their wings are transparent. All *A. spungisi* sp. nov., arriving one by one in a period of ca 30 mins, were collected. At the observation date, rain had not fallen for nearly 4 months in the region according to the data collected from locals. It is possible at rainy times the water level in the springs and ravine is significantly higher than at the time of observation.

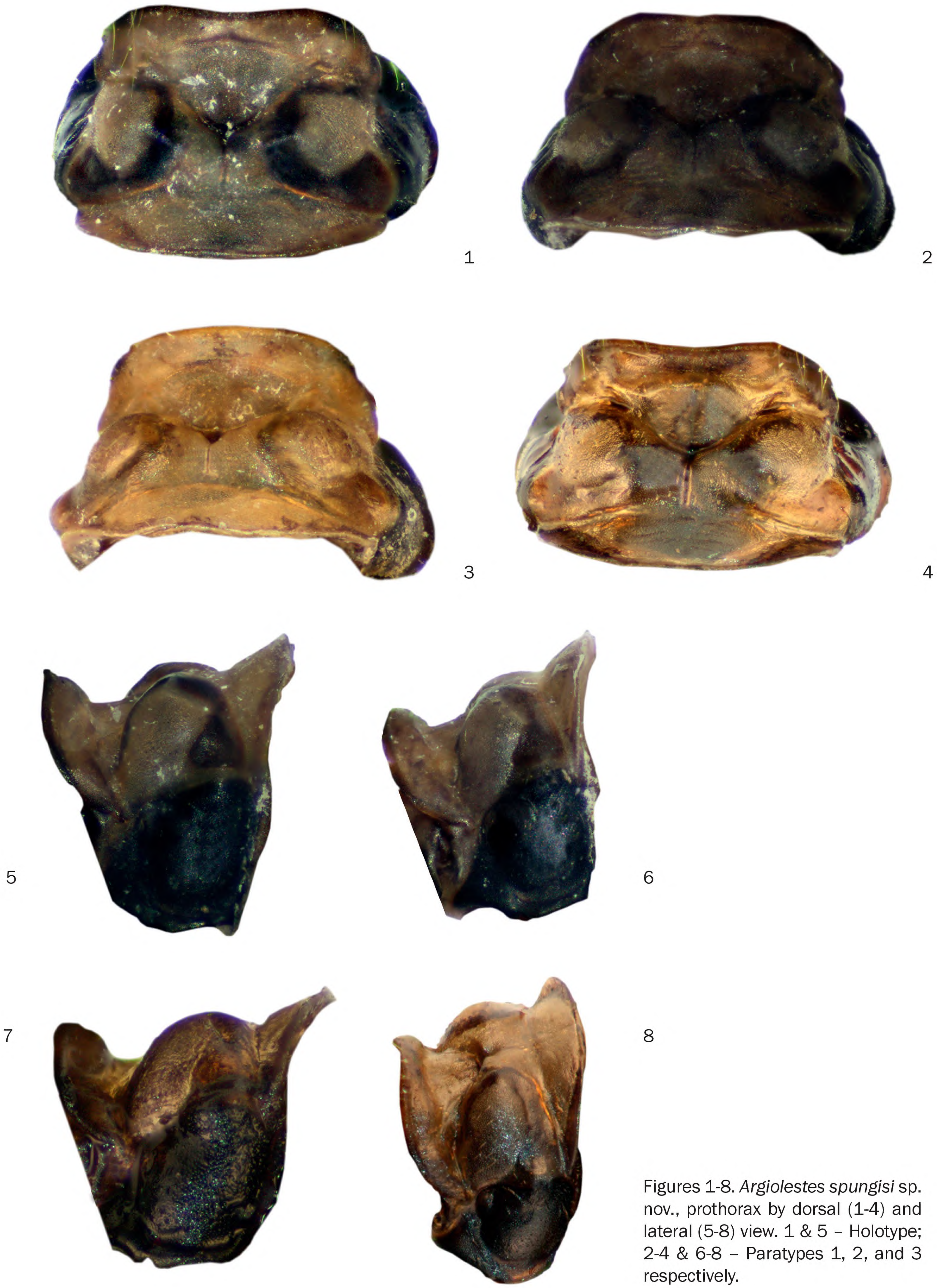
Discussion

According to Kalkman et Theischinger (2013) the species of *Argiolestes* occur on New Guinea and adjacent islands, the northern Moluccas and on Sulawesi. The new records of *A. spungisi* sp. nov. partly fill the gap in distribution of *Argiolestes* on New Guinea between records of *A. roon* on Roon and Mioswaar islands, *A. pallidistylus* on Vogelkop (= Doberai) Peninsula and *A. australis* on Waigeo Island and near Sorong on Vogelkop Peninsula (Kalkman et al. 2010; Kalkman & Orr 2013). The known range of *Argiolestes* is now larger to meanwhile available unidentified specimens from several places on Onin Peninsula collected by the author and by Dmitry Telnov (Map 1). Together with here described *A. spungisi* sp. nov., the genus *Argiolestes* includes 13 species. The current finding of *A. spungisi* sp. nov. complements and confirms current limited information on habitats of the genus *Argiolestes*, namely that the larvae probably live in seepages and small brooks in forest. According to the observations of *Argiolestes* by various authors (c.f. Kalkman & Theischinger 2013; Kalniņš 2014), most individuals were flying or resting in almost totally shaded streams or in shaded stream stretches. However the recent observation of *A. australis* on Waigeo Island (see Introduction) shows that not all species or specimens avoid sun exposed places (Plate 55 figs 1-2).

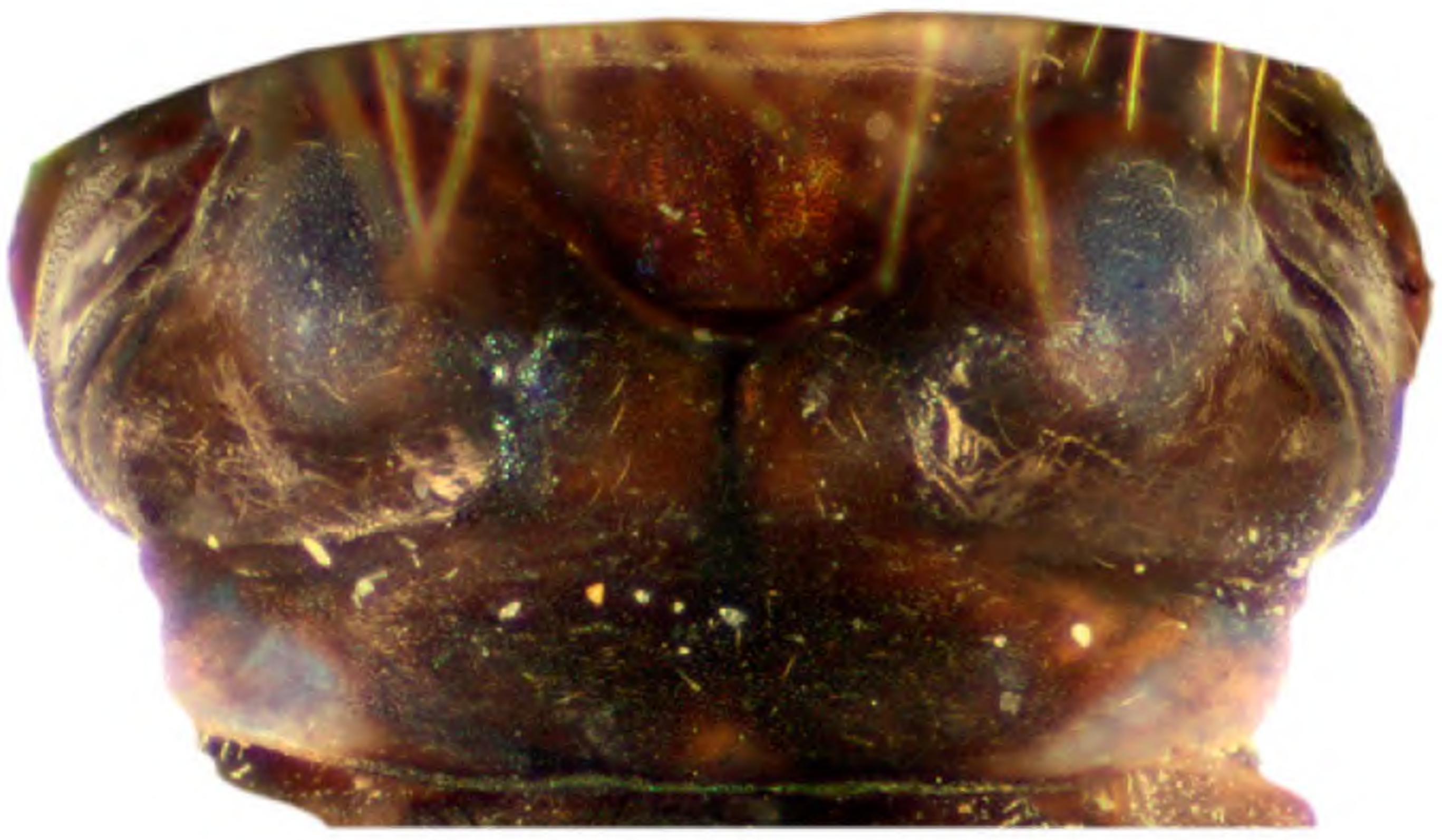
Acknowledgements

I am greatly indebted to Dmitry Telnov (The





Figures 1-8. *Argiolestes spungisi* sp. nov., prothorax by dorsal (1-4) and lateral (5-8) view. 1 & 5 – Holotype; 2-4 & 6-8 – Paratypes 1, 2, and 3 respectively.



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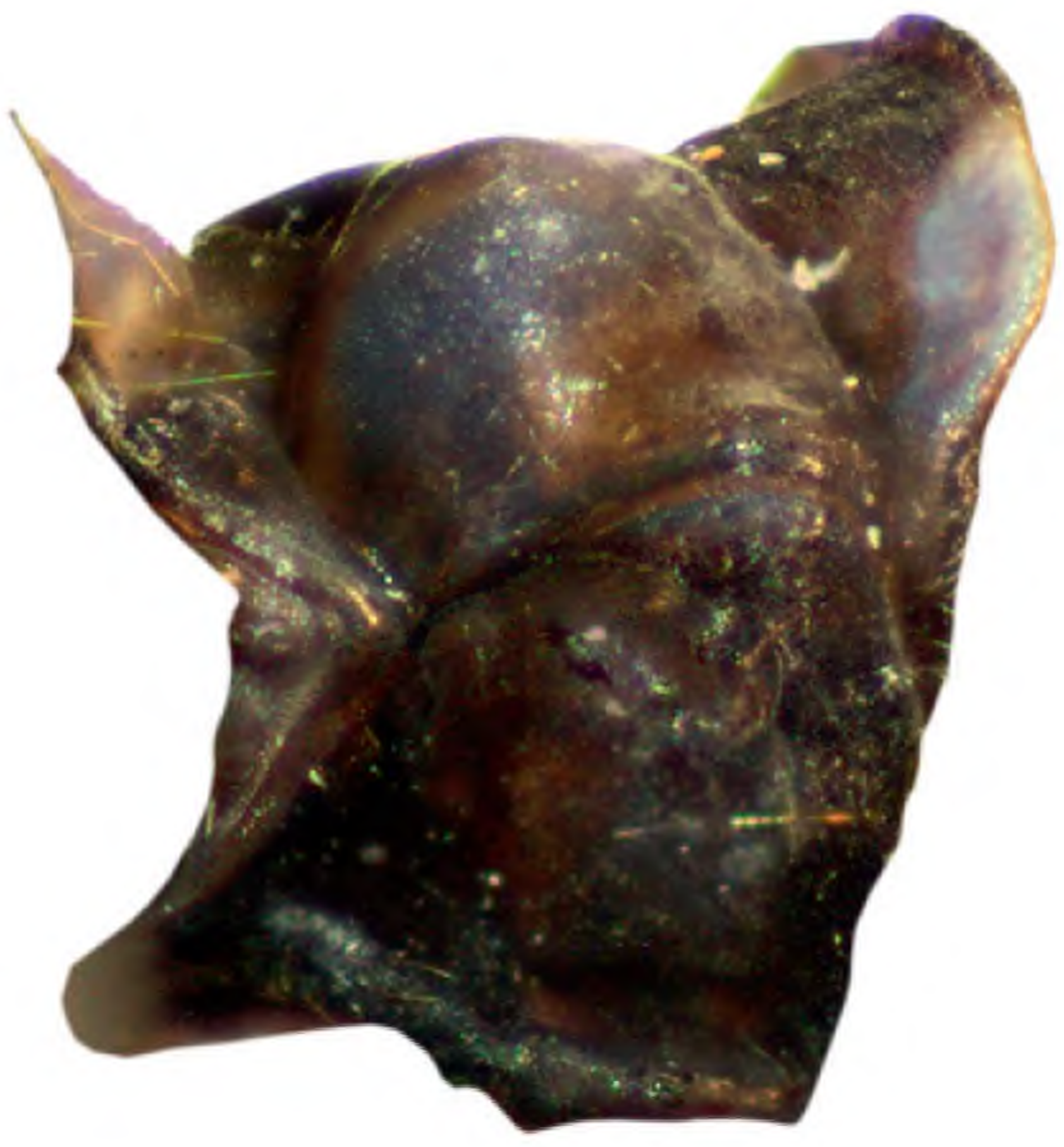

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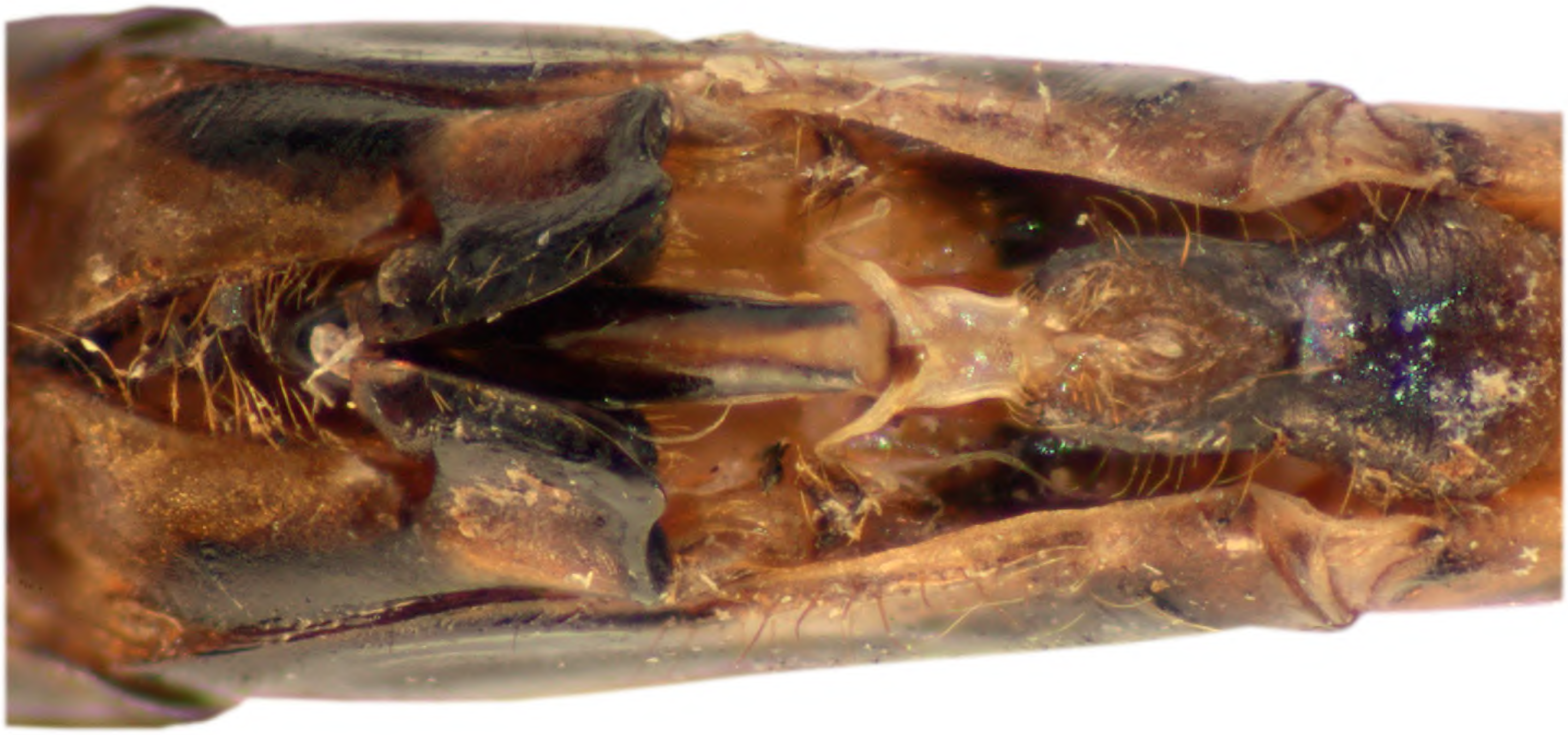
Figures 9-10. *Argiolestes australis* (Guérin-Meneville, 1830), prothorax, dorsal (9) and lateral (10) view.



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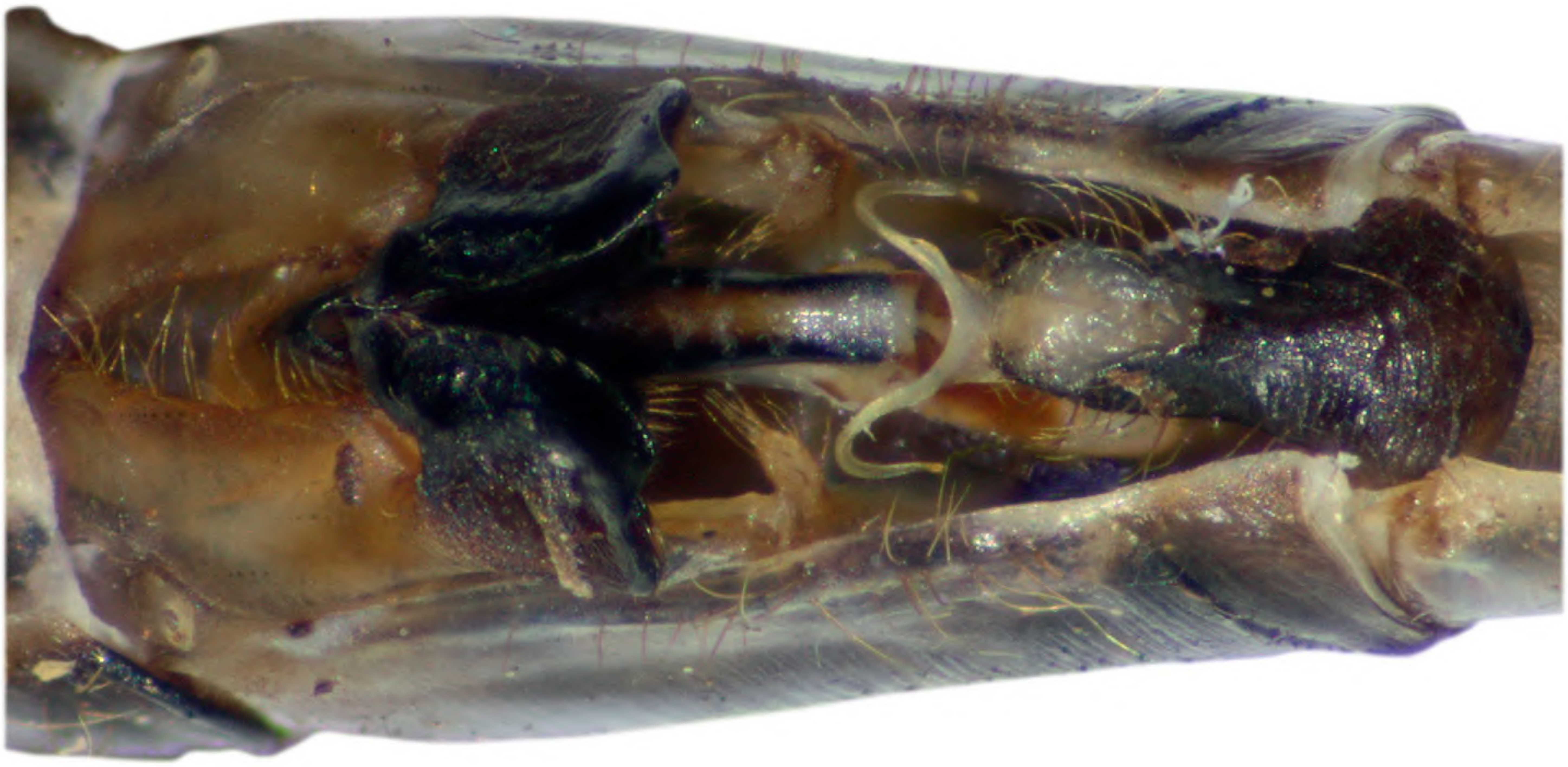

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Figures 11-12. Male accessory genitalia of Papuan *Argiolestes*, ventral view. 11 – *A. spungisi* sp. nov., paratype 3; 12 – *A. australis* (Guérin-Meneville, 1830), specimen from Waisai 10-13 km NE, Waigeo Island.

Entomological Society of Latvia, Rīga) for providing dragonfly material from New Guinea and for valuable suggestions useful in the preparation of the final version of the article, to Laszlo Wagner (www.east-indonesia.info) for guiding and help in expeditions, to Vincent J. Kalkman (Naturalis Biodiversity Centre, Leiden, the Netherlands) for providing literature on the Australasian region, to Günther Theischinger (Office of Environment and Heritage, Sydney, Australia) for reviewing the manuscript, and to Māris Lielkalns (Rīga Zoo, Rīga, Latvia) for processing figures.

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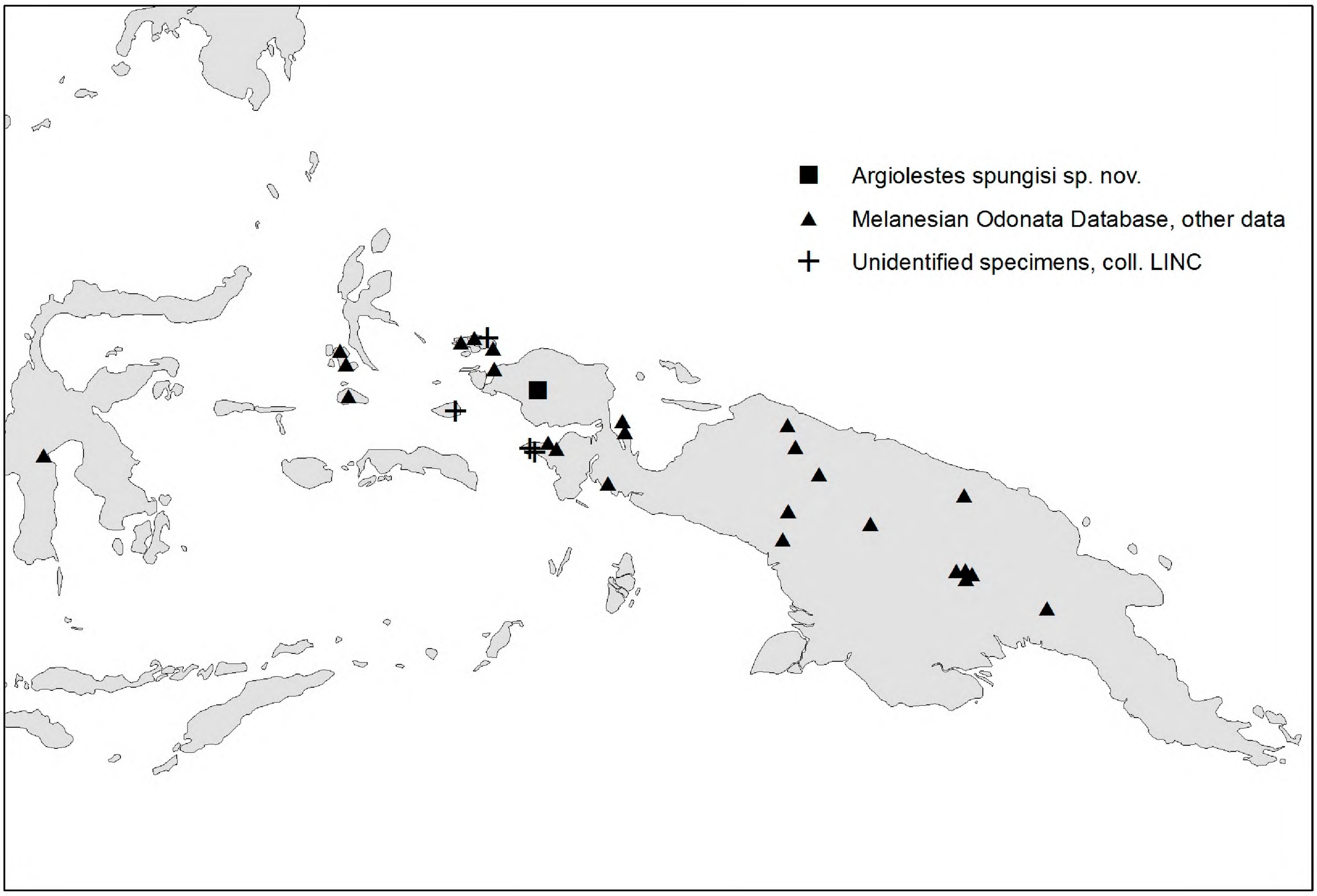
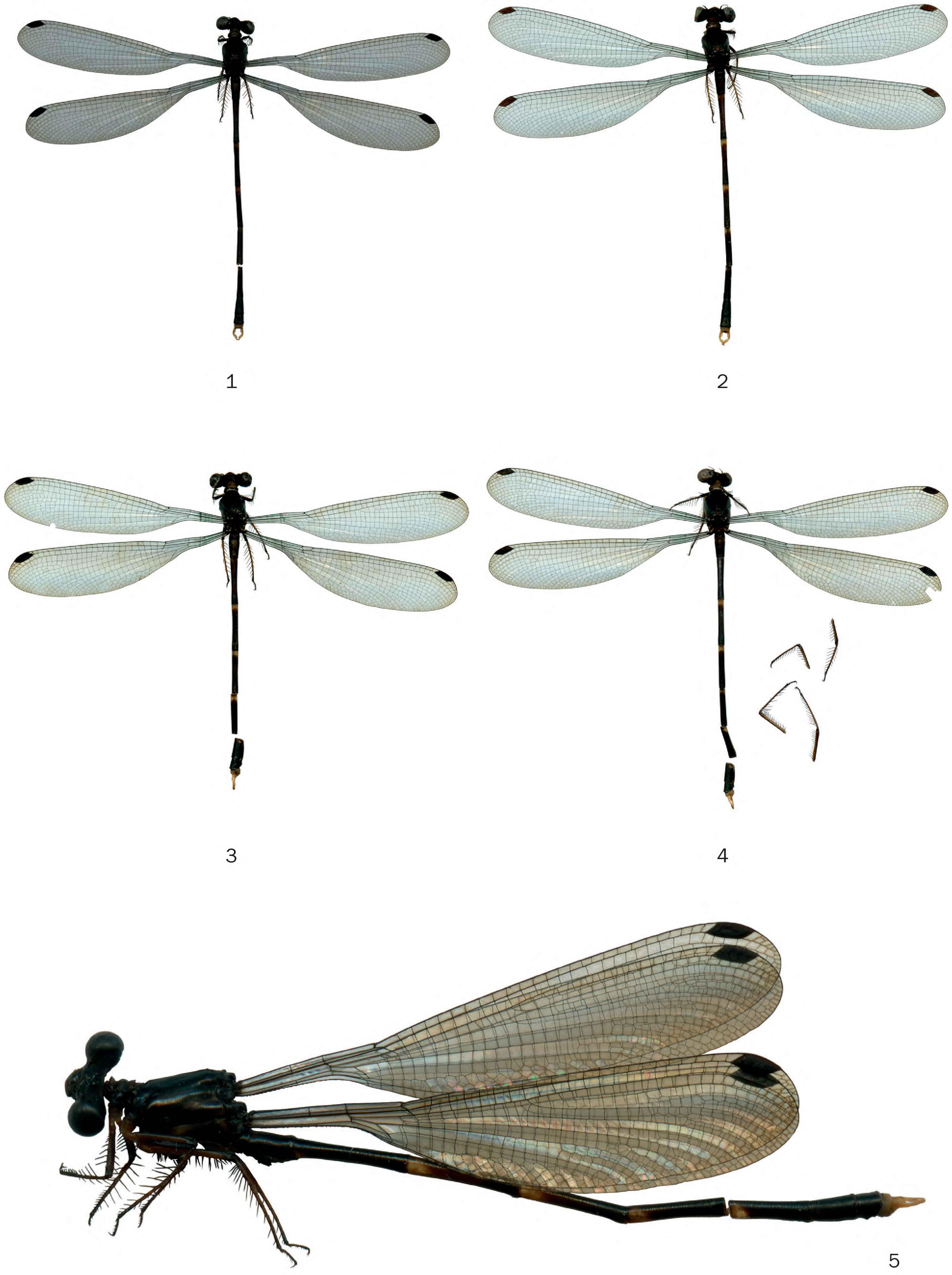

■ Argiolestes spungisi sp. nov.
▲ Melanesian Odonata Database, other data
+ Unidentified specimens, coll. LINC

Map 1. Distribution of *Argiolestes* s. str. based on records in the Melanesian Odonata Database with locality of *Argiolestes spungisi* sp. nov. and localities of unidentified specimens (map updated from Kalkman & Theischinger 2013 and Kalniņš 2014).

Plate 52

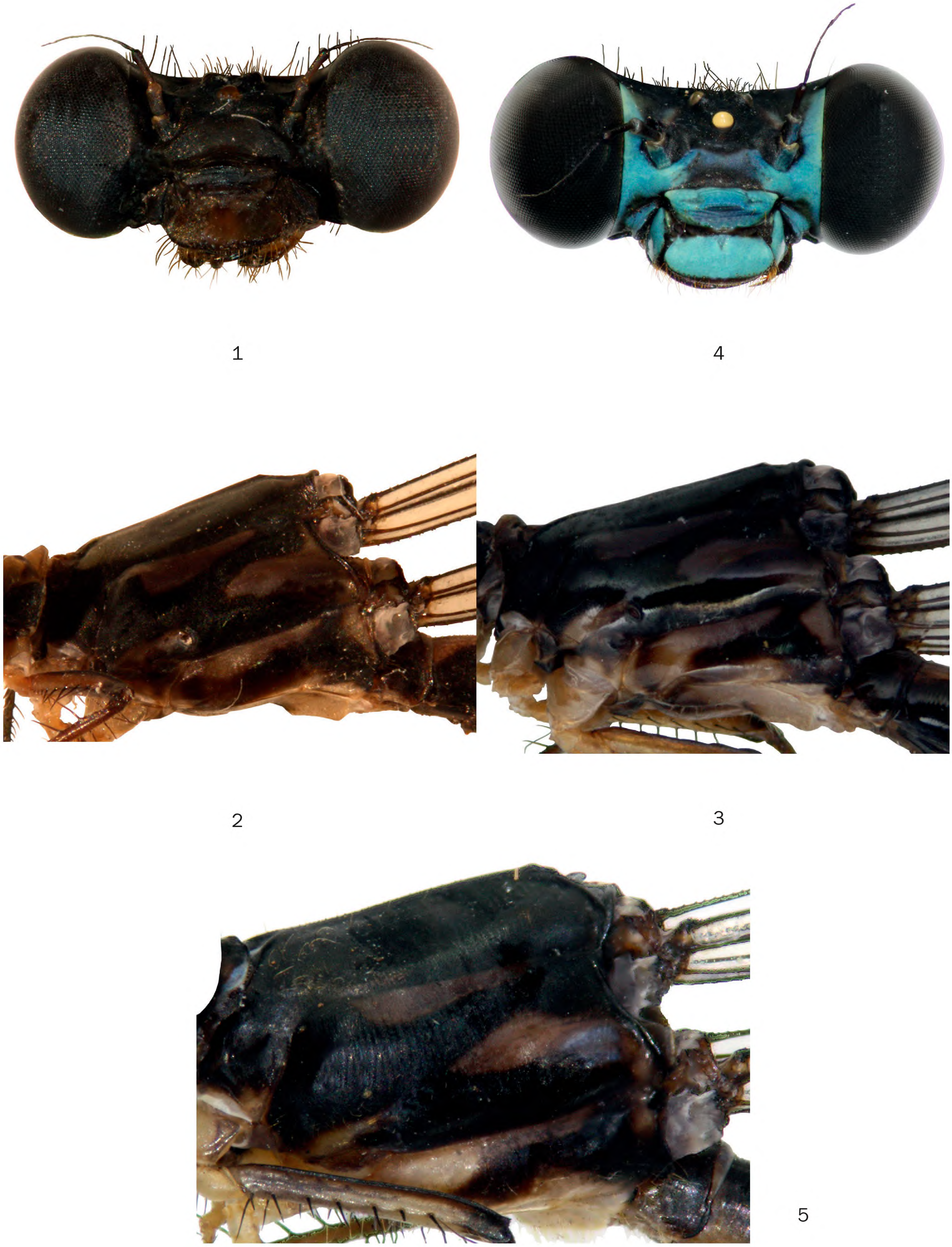
Kalniņš, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea



Figures 1-5. *Argiolestes spungisi* sp. nov., males, dorsal (1-4) and lateral (5) view. 1 & 5 – Holotype; 2 – Paratype 1; 3 – Paratype 2; 4 – Paratype 3.

Plate 53

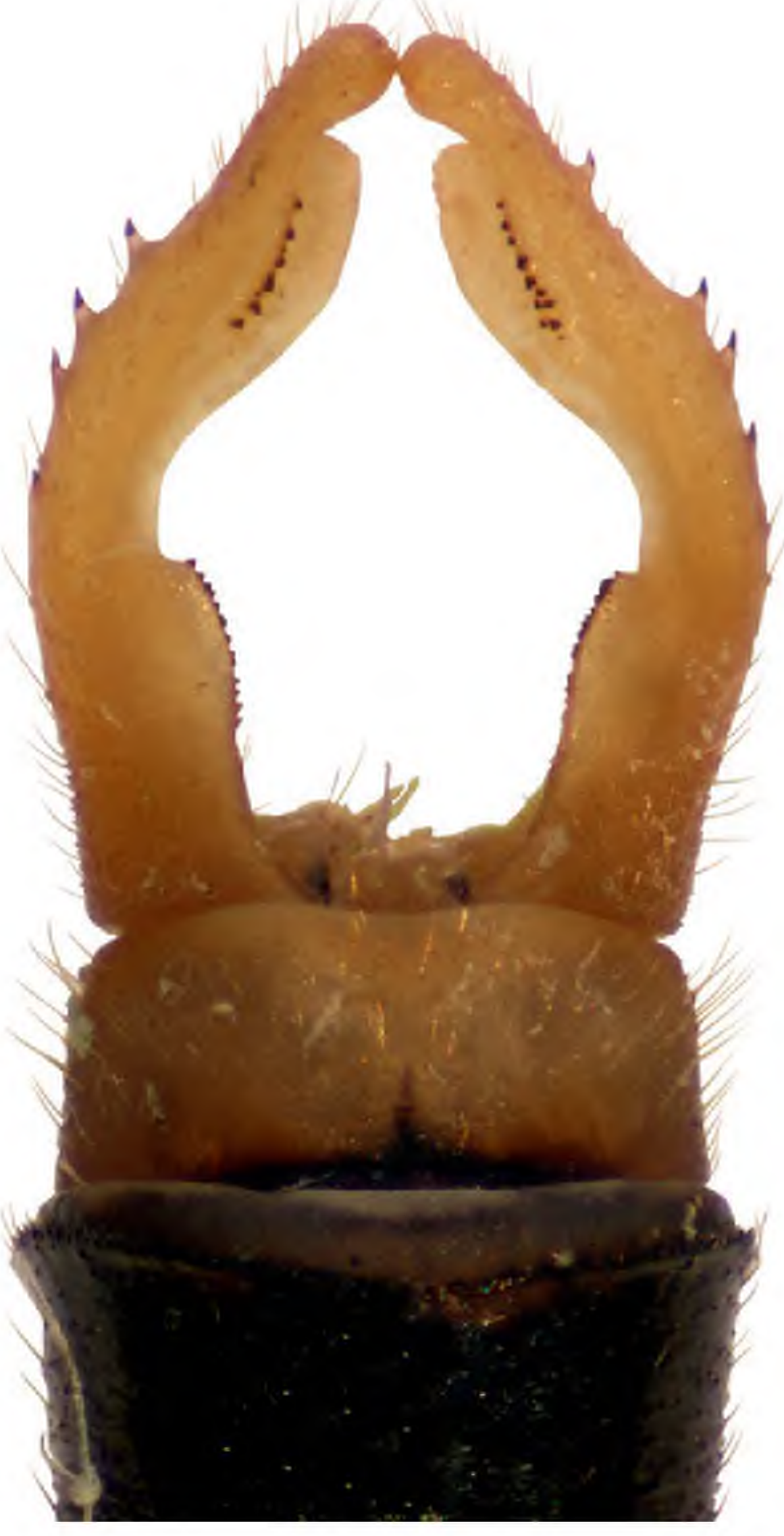
Kalniņš, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea



Figures 1-5. Papuan *Argiolestes*. 1-3 – *A. spungisi* sp. nov.: 1 – Holotype, head, frontal view; 2 – Holotype, thorax, lateral view; 3 – Paratype 1, thorax, lateral view; 4-5 – *A. australis* (Guérin-Meneville, 1830), specimen from Waisai 10-13 km NE, Waigeo Island: 4 – Head, frontal view; 5 – Thorax, lateral view. Consider lost blue colouration of thorax in figures 2-3 & 5.

Plate 54

Kalniņš, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea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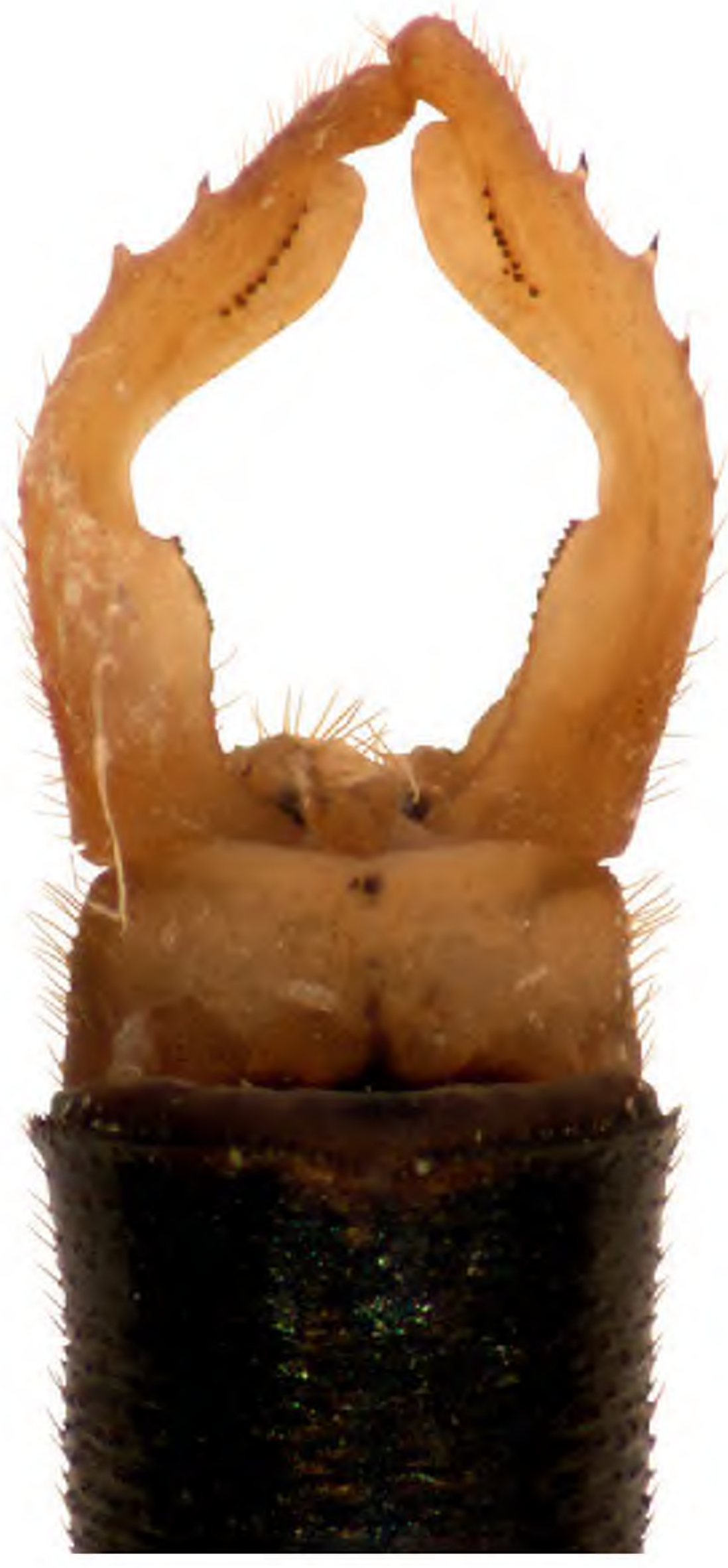
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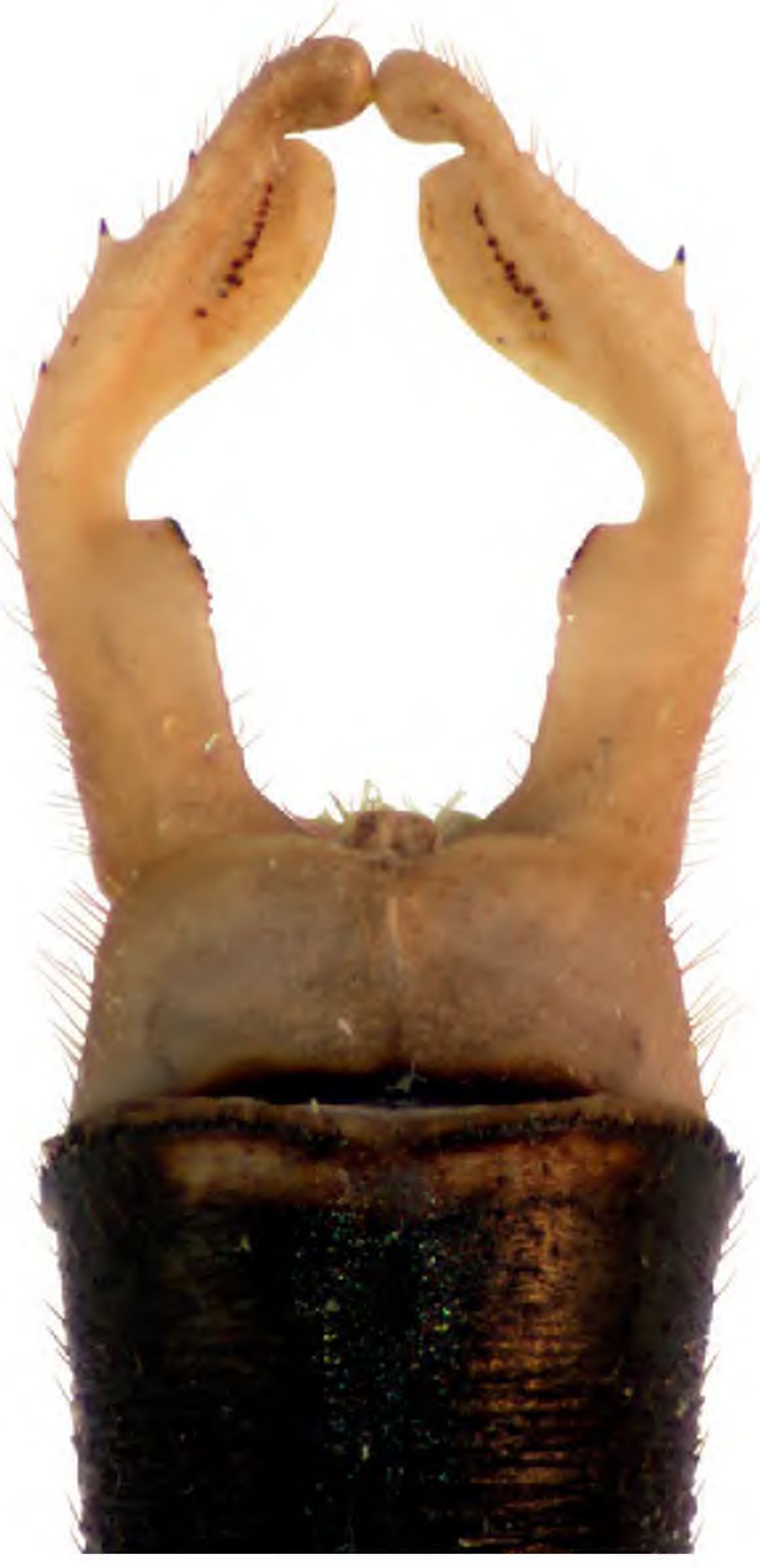
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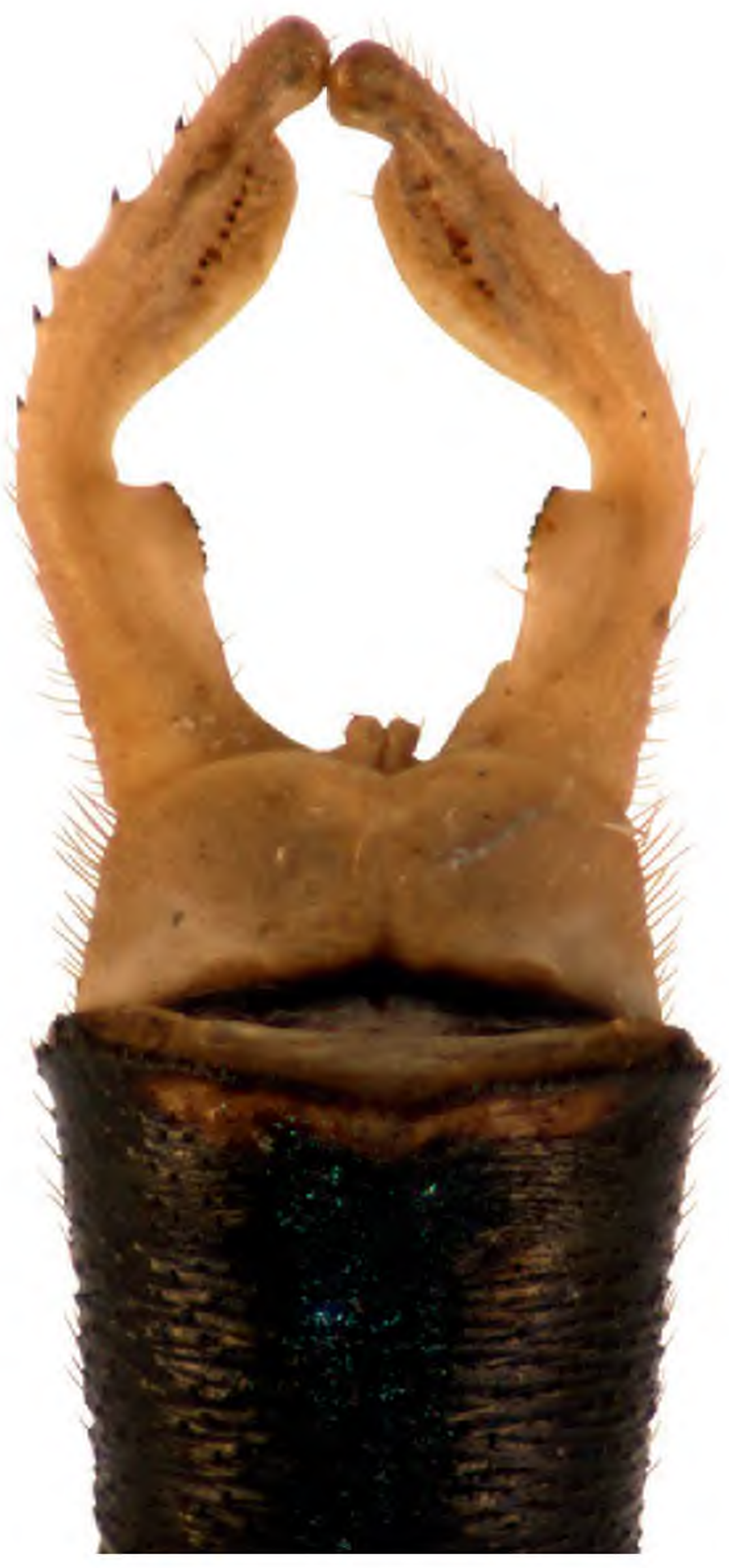
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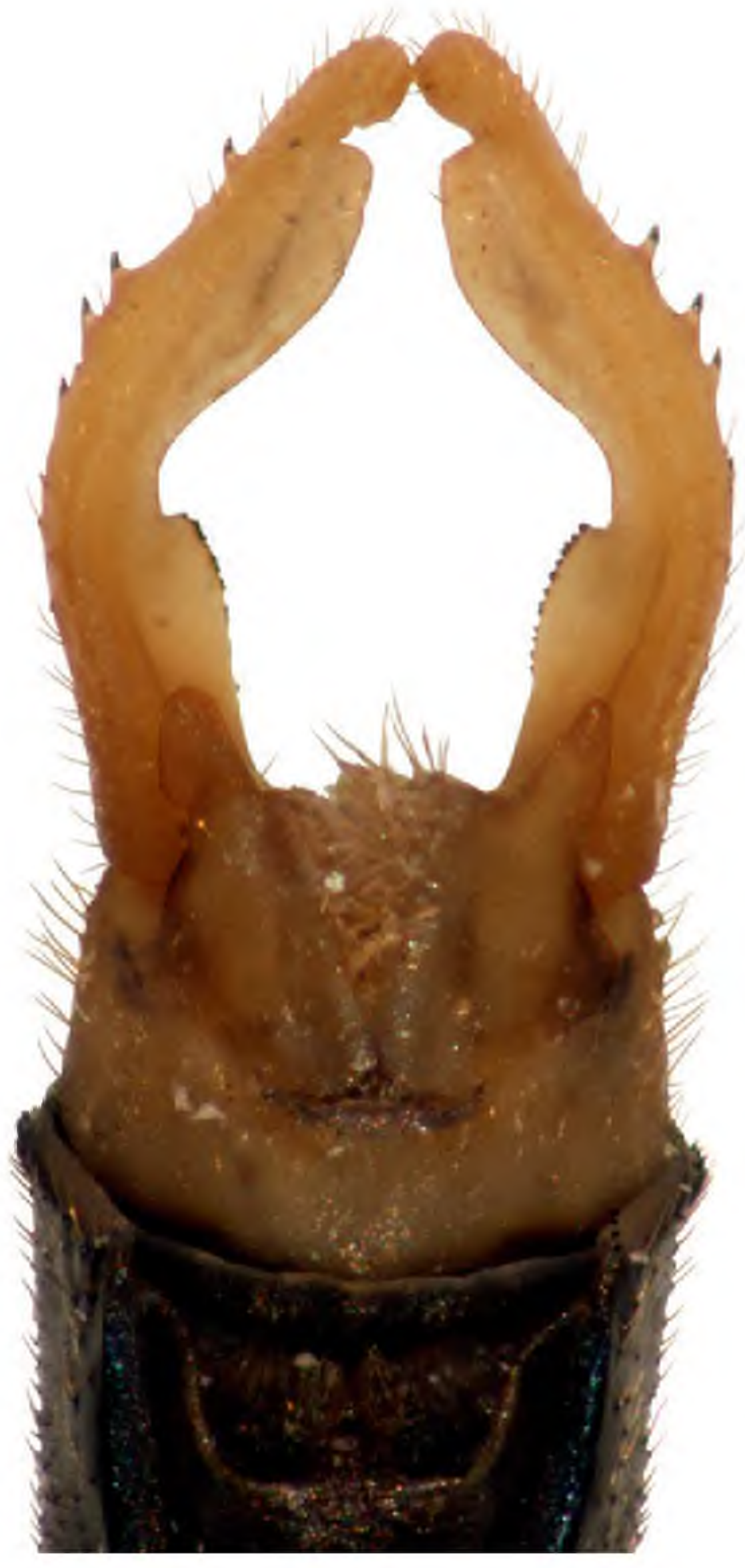
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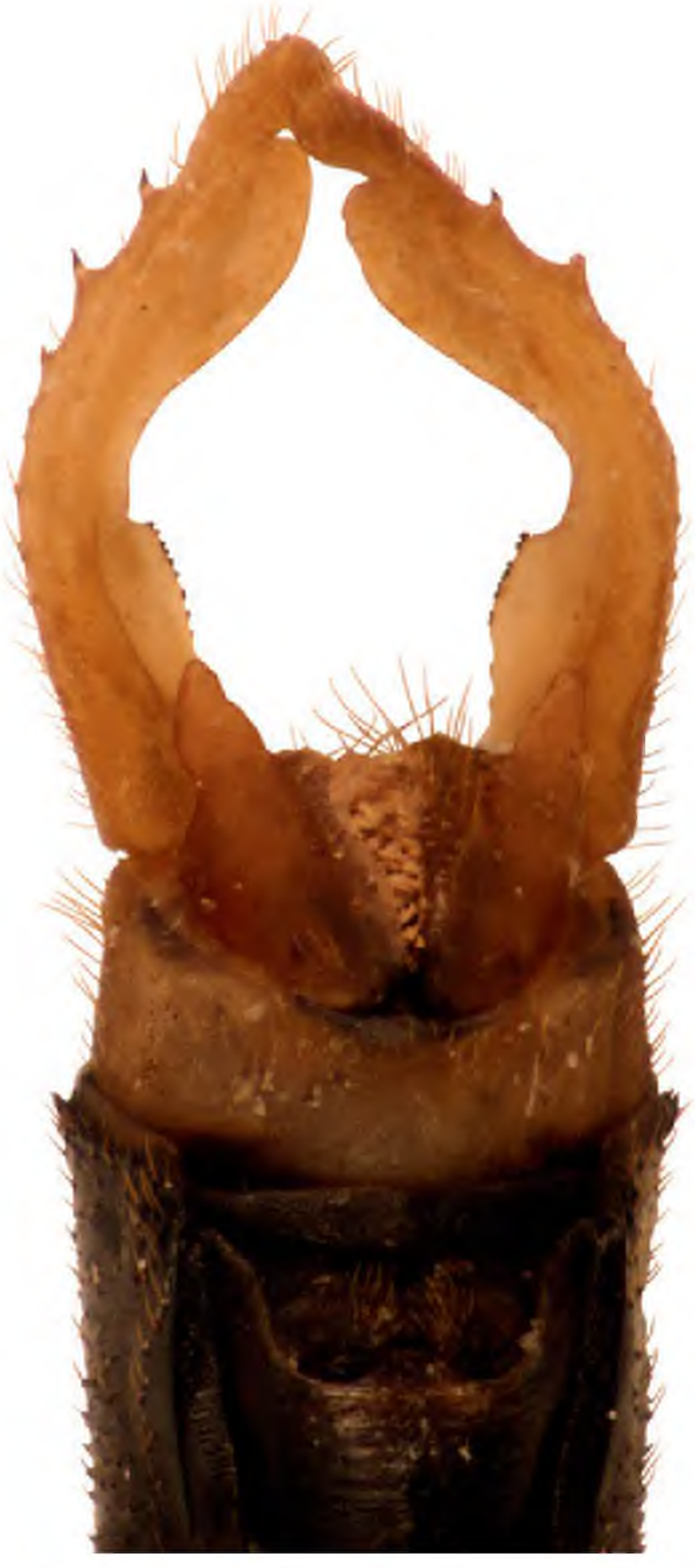
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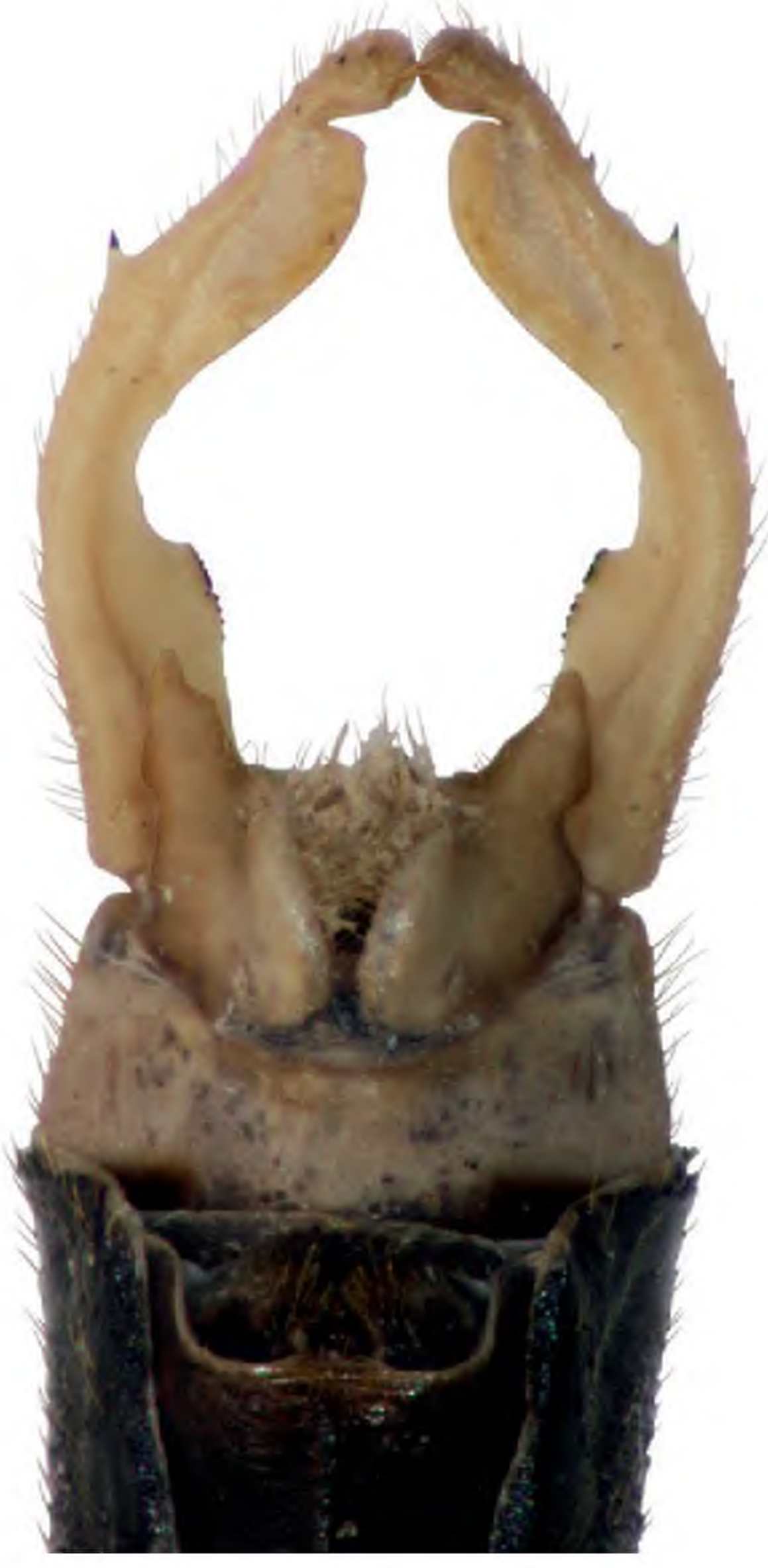
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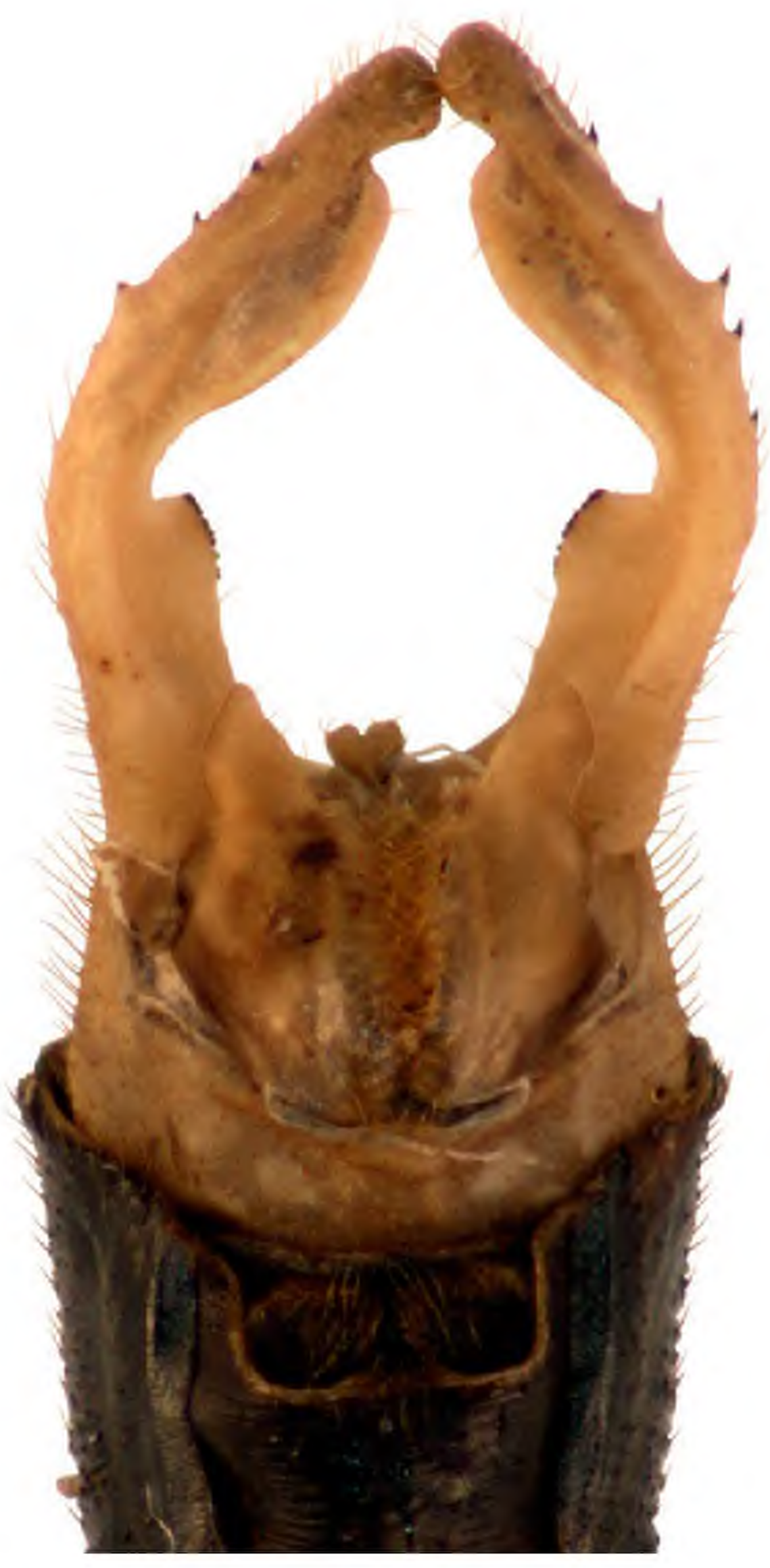
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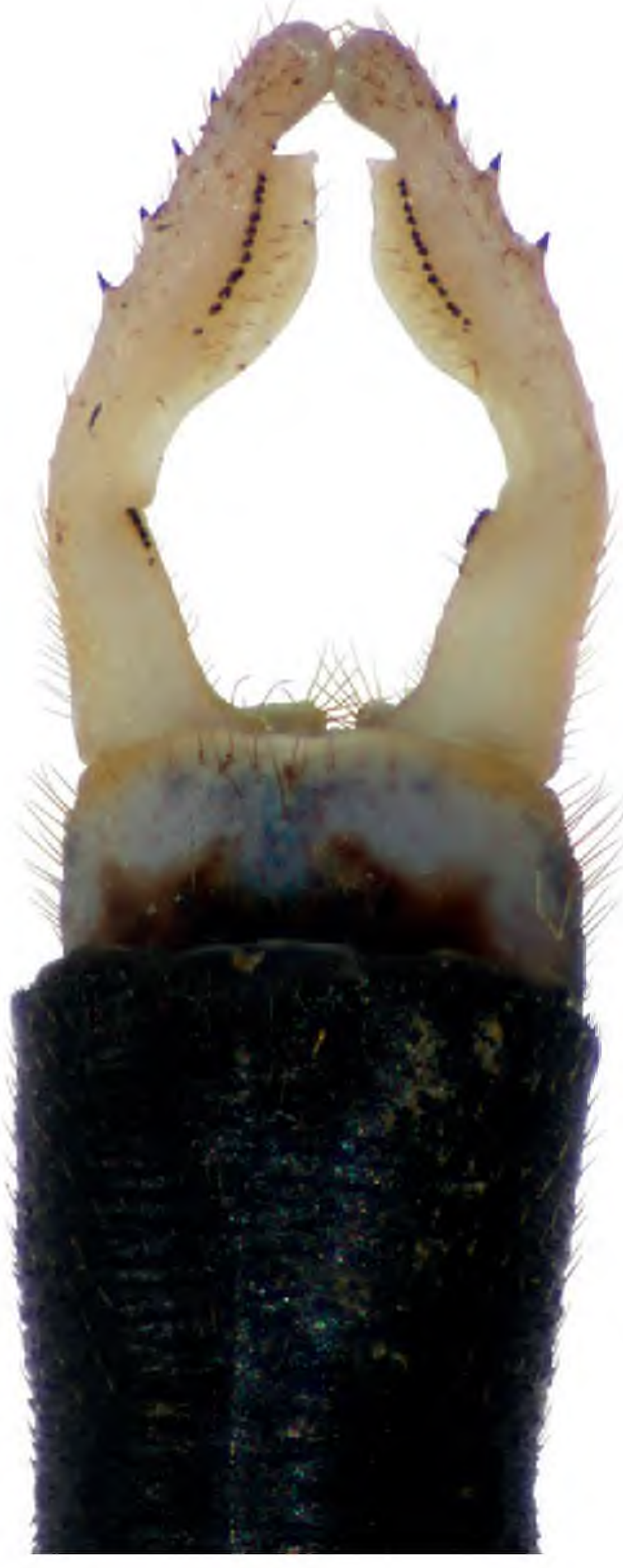
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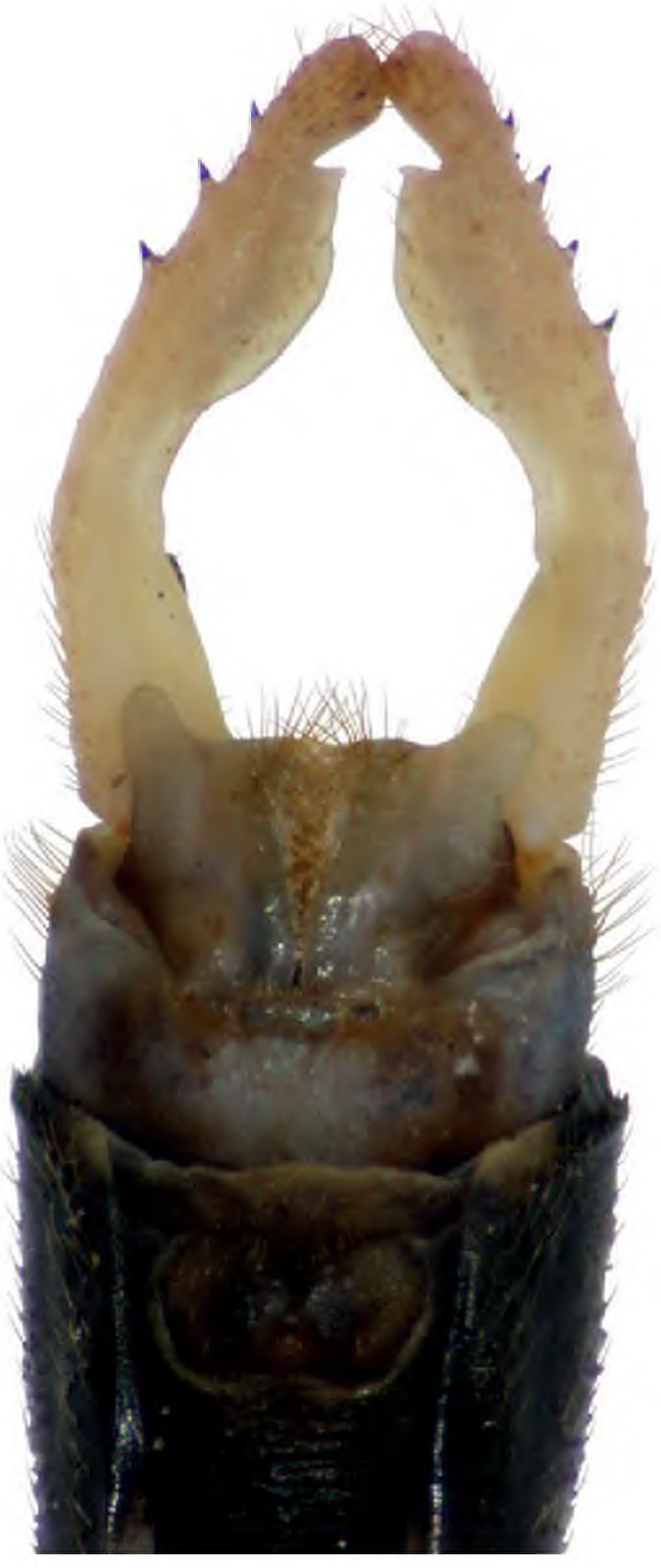
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Figures 1-10. Papuan *Argiolestes*, tip of male abdomen in dorsal (1-4 & 9) and ventral (5-8 & 10) view. 1-8 – *A. spungisi* sp. nov.: 1 & 5 – Holotype; 2 & 6 – Paratype 1; 3 & 7 – Paratype 2; 4 & 8 – Paratype 3; 9-10 – *A. australis* (Guérin-Meneville, 1830), specimen from Waisai 10-13 km NE, Waigeo Island.

Plate 55

Kalniņš, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea

1 2

Figures 1-2. Limestone creek 10-13 km NE Waisai, Waigeo Island - the habitat of *Argiolestes australis* (Guérin-Meneville, 1830). Observed and sampled individuals were flying over and along the creek on sunny place.